ceous deposits which could not be attributed to decomposition of the rocks in situ, or to the alluvium deposited by the rivers, or to rain. He attributed them to atmospheric currents. The winds by day raise the particles from the plains, and carry them at night to the hills.

EUROPE.—*European News.*—Sulitjelma, in 67¼° north latitude, and belonging as much to Norway as to Sweden, has hitherto been believed to be the highest Swedish mountain. Last year the topographical surveyor of Norrland found that Sarjekjakko, in Swedish Lapland, is quite 1000 feet higher than Sulitjelma, that is, about 7000 feet. Dr. Svenonius now states that Kebnekaisse, also in Lapland, has been ascertained to be 7300 feet above sea-level.——The rocky islet Munken, three and a half miles south of Sumbö, has completely subsided. The rock is well-known in history. It is mentioned in 1673 by Pastor Lucas Jacobson Debes, and plays a conspicuous part in geographical literature, especially with reference to the Zeni narrative. The islet was formerly seventy feet high, but is now no higher than the surrounding rocks, so that the sea covers it even in fine weather. The shoals around are dangerous, and will now be more so. In 1800 the rock was described as like a ship under full sail when seen from seaward, while from the land it resembled the figure of a monk.

GEOLOGY AND PALÆONTOLOGY.

POLEMICS IN PALÆONTOLOGY.—The present activity in vertebrate palæontology is accompanied by considerable controversy in various directions. M. Lemoine and M. L. Dollo are at issue regarding the identity or non-identity of the genus Champsosaurus Cope and Simœdosaurus Gervais; M. Dollo maintaining their identity and referring to the Champsosaurus, a skeleton found at Erquelines. M. Lemoine states that the Erquelines example comes from an horizon different from that which yielded Simœdosaurus, and that, in order to force an identification, M. Dollo has accused him (M. Lemoine) of errors which he did not commit. On the identity of the American and Cernaysien forms M. Lemoine reserves his opinion. M. Dollo answers by asserting the identity of horizon of the French and Belgian specimens, and giving reasons for considering the remains as belonging to the same species. Passing in review the cranium, atlas and axis, vertebræ, scapula and coracoid, and other parts, he not only denies the existence of any proved divergence between the American, Cernaysien and Belgian examples, but declares that the bones described by M. Lemoine as scapula and coracoid are really not those bones, since they are shown as placed one over the other, whereas there is a true articulation between the actual scapula and the coracoid. He suggests that the scapula of M. Lemoine may be a part of the coracoid.

Dr. Schlosser, of Munich, endeavors to show that Dr. Lydekker is in error in proposing, in the catalogue of the vertebrate fossils in the British Museum, to combine certain species of Rodentia, described by him in his monograph of the Tertiary Rodentia of Europe.

Dr. Lydekker, in the London *Geological Magazine*, reviews the illustrated papers published by Professor Cope in the AMERICAN NATURALIST on American fossil Vertebrata. He differs generally with the systematic views of Professor Cope, and diverges even more from him in his nomenclature. This paper will be answered by Professor Cope. Dr. Lydekker affirms the identity of Hyopsodus Leidy with Microchœrus Wood; and of Esthonyx Cope with Miolophus Owen. Professor Cope, in a note to the *Geological Magazine*, shows that there is not sufficient ground for the latter identification.

Dr. Baur believes that the bone in Iguanodon supposed by Marsh to be clavicle, is really sternum, as indicated by Dollo.

THE ANKLE AND SKIN OF THE DINOSAUR, DICLONIUS MIRABILIS.—The fibula of this saurian lies at its distal end in a groove of the external part of the front of the tibia. It is compressed so as to be anteroposterior. It terminates in an epiphysis-like calcaneum. The astragalus has the usual form, and embraces the tibia closely. Its anterior ascending process is rather short and thin. Posteriorly the tibia rests on the astragalus and is not overlapped by it. A portion of the extremity descends and fills an angular space which enters between the astragalus and calcaneum behind, and takes part in the ankle-joint. This does not occur in the *Ornithotarsus immanis*.

A portion of the integument from the pelvic region of this dinosaurian is preserved. It is indicated by a thin brown layer like the remains of corneous teeth, which I have described as existing in the premaxillary region.[1] It is in the form of small sub-pentagonal disk-like scales, each with a beveled and coarsely crenate margin. They do not fit closely except at the interior or basal part of their edges. The scales resemble considerably the divisions of the skin of *Rhinocerus sondaicus*. The scales are about a centimeter in diameter.—*E. D. Cope.*

PLIOCENE HORSES OF SOUTHWESTERN TEXAS.—The pliocene beds of Southwestern Texas have yielded several interesting species of Mammalia. Among these may be mentioned *Mastodon americanus* Cuv. and *M. serridens* Cope,[2] and *Cistudo marnockii* Cope. But horses of the genus Equus are the most numerous in species and individuals. The following identifications are based on specimens received from Messrs. Wm. Taylor and G. W. Marnock, to whom I hereby express my acknowledgments.

[1] Proceedings Academy Philadelphia, 1883, p. 104.

[2] NATURALIST, 1884, p. 525.

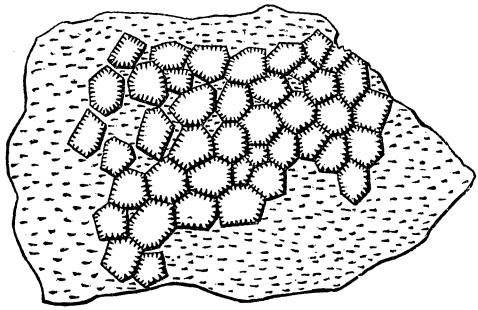

Fig. 1.

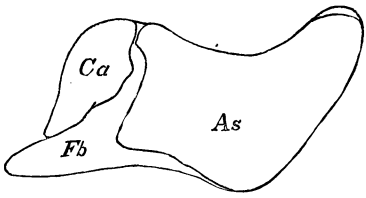

Fig. 2.

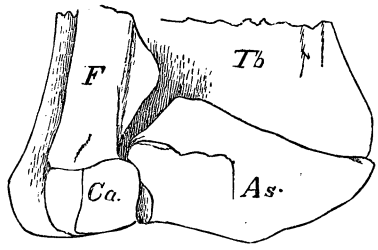

Fig. 3.

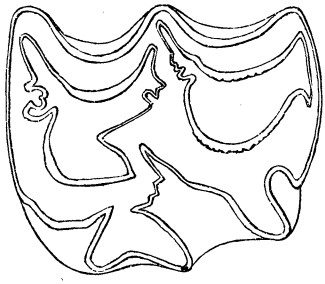

Fig. 4.

Fig. 5.

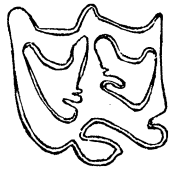

Fig. 6.

FIG. 1.—Portion of the skin of *Diclonius mirabilis*, three-fourths natural size. FIGS. 2, 3.—Extremity of fibula and tibio-tarsus of do., one-seventh nat. size; 2 from below, 3 from front; *Tb*, tibia; *F*, fibula; *As*, astragalus; *Ca*, calcaneum. FIG. 4. — *Equus crenidens?* Cope: grinding face of superior molar tooth, nat. size. FIG. 5.— Superior molar tooth of right side of *Hippotherium peninsulatum* Cope; grinding surface from below, natural size. FIG. 6.—The same of *Protohippus castilli* Cope; same view, natural size.

EQUUS BARCENAEI Cope. Proceeds. Amer. Philos. Society, 1884, pp. 10–15. One superior molar. Hitherto only known from the valley of Mexico. From Mr. Marnock.

EQUUS FRATERNUS Leidy, 1858..*E. tau* and? *conversidens* Owen, 1869. From Mr. Marnock.

EQUUS EXCELSUS Leidy. Approaches the last named species. From Mr. Taylor.

EQUUS OCCIDENTALIS Leidy. The most southern and eastern locality for this species, which has not hitherto been found away from California and the Great Basin. One very characteristic superior molar, from Mr. Taylor.

EQUUS? CRENIDENS Cope. Proceedings Amer. Philosoph. Society, 1884, p. 10–12.

This or a nearly allied species is represented by a single, and the largest, superior molar tooth of a horse which I have seen or find recorded. The measurements exceed those of the typical *E. crenidens* (which has not, so far, been found out of the Valley of Mexico), and there are some other differences in the distribution of the enamel-folds. It is distinguished from the other species of Equus by the small diameters and concaved inner border of the anterior internal column, by the simplicity of the enamel-folds, and the crenate character of the margins of the lakes, together with the large dimensions. The crenation is less obvious in some specimens than in others, and in the one here noticed is almost confined to the borders of the posterior lake. The diameters of the crown measure: anteroposterior, 41^{mm}; transverse, 37^{mm}; length, 120^{mm}.

Fig. 4, Plate XXXVII, represents the grinding face in outline.

Of the five species of Equus of Southwestern Texas, four have been found in the pliocene of the Valley of Mexico, and one is peculiar to the Pacific coast and basin of North America. Of the characteristic species of the Eastern United States, *E. fraternus* and *E. major*, the former only has been found. (For comparison I introduce Figs. 5 and 6, Pl. XXXVII, of three toed horses from the Loup Fork bed of Mexico. See Proceeds. Amer. Philos. Soc., Oct., 1885.)—*E. D. Cope.*

LIST OF THE GEOLOGICAL FORMATIONS OF SPITZBERGEN.[1]—*Quaternary system.*—Beds of sand and clay with remains of terrestrial plants, marine shells and weeds (some species not living at present on Spitzbergen, *e. gr.*, *Littorina littorea*, *Mytilus edulis*, and *Fucus canaliculatus*), "Blomstrand's beds," "beds of the Reindeer valley," etc.

Miocene system.—Sandstones, schists, etc., at King's bay, Cape Staratschin, Cape Heer, Heer's mount, Cape Lyell, Scott's glacier, with more than 200 sp. of fossil plants, *e. gr.*, Equisetum, Sequoia, Taxodium, Glyptostrobus, Pinus, Acorus, Iris, Acer, Platanus, Tilia, Corylus, Populus, Grevia, Hedera, etc.

Cretaceous system.—Sandstone at "the Fastness" (ice fiord)

[1] According to Osw. Heer's Flora Fossilis Arctica, and the discoveries of the Swedish expeditions by O. Torell, A. E. Nordenskiöld, C. W. Blomstrand, A. Nathorst, P. Oberg and G. Nauckhoff.

with about twenty sp. fossil plants, among which *Sequoia reichenbachii.*

Jurassic system.—1. Upper beds: The beds at Cape Boheman with fossil plants, *e. gr.*, *Ginko digitata*, Pinus, Podozamites, Scleropteris, etc. 2. Lower beds: The marine beds of Cape Staratschin, Green harbor, Advent bay, Sassen bay, Cape Agardh, with Ammonites, Belemnites, Cardium, Leda, Inoceramus, Aucella, Pecten, Ophiura, etc.

Triassic system.—Bituminous limestones and schists of Cape Thordsen, Saurie hook, Cape Staratschin, Cape Lee, Whales point, with bones of Reptilia, *e. gr.*, Ichthyosaurus, Acrodus, etc.; and Mollusca, *e. gr.*, Ammonites, Ceratites, Daonella, Halobia, Pecten, Lingula, etc., and with beds of phosphates of lime.

Carboniferous system.—1. Upper beds: Sandstones, schists, etc., at Recherche bay, with vegetable fossils, *e. gr.*, Lepidodendron, Lepidostrobus, Stigmaria, Cordaites, Rhabdocarpus, Adiantites, Sphenopteris, etc. 2. Calcareous beds with Productus, Spirifer, Rhynchonella, Chonetes, Euomphalus, etc.; limestones, sandstones, schists, gypsum and silex of Beeren island, South cape, Horn sound, Bell sound, Ice fjord, King's bay, Henloopen strait, Stansforeland, etc. 3. Lower beds ("palæanthracitic beds," "ursastuffe"): Schists, sandstones and coals of Beeren eiland, Klaas Billen bay and Bell sound, with Lepidodendron, Stigmaria, Calamites, Cyclostigma, Knorria, Cardiopteris.

Devonian system? ("The Liefde bay formation").—Green and red schists, red sandstones and limestones at Liefde bay, Wijde bay, Dickson bay, Klaas Billen bay and Beeren eiland, with indeterminable fish-scales and bivalves.

Silurian system? ("The Hecla Hook formation").—Quartzites, dolomites and black schists from different localities, and containing indeterminable bivalves. The whole western part of Spitzbergen and the Northeastland.

Primitive system. — Gneiss, mica schists, quartzites, marbles, dioritic schists, granites, etc., of the N. E. part of Spitzbergen, North cape, Seven islands, etc.—*J. Lindahl.*

GEOLOGICAL NEWS.—*General.*—G. F. Becker (*Amer. Journ. of Science*, Sept., 1884) has a note upon the relations of the mineral belts of the Pacific slope to the great upheavals. A great majority of all the profitable ore deposits west of the crest of the Wasatch occur in belts a few miles in width which follow the western edges of distinct geological areas. Thus the lead-silver belt of Utah follows the Cretaceous, the belts of Nevada and Arizona the Palæozoic, and usually the Carboniferous; the gold belt of Eastern California the Jura-trias, and the quicksilver belt of Eastern California the Tertiary.——*Psyche* contains a contribution to the geological history of myriopods and arachnids, by S. H. Scudder. The group Archipolypoda resemble the Diplopoda in having two pairs of legs on every segment; while in the Proto-

sygnatha only a single pair of legs is borne by each segment, and the group thus resembles the Chilopoda. For a brief period after leaving the egg, modern diplopods and pauropods have a shorter body than in after life, and the first three segments bear but a single pair of legs. In adult life these first three segments still bear but a single pair of limbs, while all the other segments, both those which exist in the larval state and those which develop afterwards, bear two pairs. The Chilopoda have these same three anterior pairs of limbs early and permanently developed as organs of manducation, while all other segments have but a single pair. Palæontological evidence is in favor of the view that the dorsal scutes of Diplopoda are compound. The archipolypodous type is the oldest, and there is evidence that some of the Carboniferous forms were amphibious. The group culminated in the Carboniferous, and does not appear to occur later than the Dyas, while, with one doubtful exception, no true diplopod is known to be older than the Oligocene.——According to S. H. Scudder between twenty and thirty species of pre-Tertiary Arachnida are now known, and the earlier forms, chiefly of Carboniferous age, belong either to the scorpionides or to the Anthracomarti, a group which is not known later than Palæozoic times, the only Mesozoic arachnids yet known being true spiders. In the amber deposits of Prussia all the suborders of Arachnida occur except the Pedipalpi and the already extinct Anthracomarti.——Sr. G. B. Villa (Atti. d. Soc. di Sci. Nat.) gives a review of the rocks of Brianza (Italy) with a list of the principal fossils of each horizon from the Trias to the most recent strata.

Mesozoic.—Bulletin No. 19 of the U. S. Geological Survey consists of notes on the stratigraphy of California, by G. F. Becker. The metamorphic rocks of the coast ranges often show proof that plication was not effected by flexure but by innumerable fractures, the resulting small fragments being retained in their approximately original position by mutual pressure and afterwards re-cemented by silica. The Knoxville beds, the age of which is near the limits of the Jurassic and Cretaceous, are the youngest beds of the coast ranges which are known to have experienced the peculiar magnesian and siliceous metamorphism of these ranges. The overlying Chico beds are shown to be nonconformable with the Knoxville beds, and over wide areas the Chico, Tejon and Miocene strata seem to be perfectly conformable with each other. The upheaval and metamorphosis of the Knoxville strata is referred to the close of the period of their deposition. The auriferous beds of Mariposa are referred to the same horizon as the Knoxville beds. It is maintained that there has been a great east and west compression of the country, connected with the great faults in the Wasatch and the Sierra, while a land barrier existed in the position of the Sierras from a time prior to the Cretaceous onward, and accounts for the difference

in the faunas of the Pacific Coast waters and those eastward of them. The Sierras and Coast ranges are referred to a single mountain system.——A. D. Achiardi gives the particulars of an examination into the macroscopical and microscopical characters of the trachyte and quartziferous porphyry of Donoratice, near Pisa, Italy. The trachyte is covered, here and there only, with Eocene sediments which seem to have been disturbed by the eruption. The porphyry traverses the parti-colored schists of the Upper Lias and also the marbles of the Lower Lias, and is only about 400 meters distant from the trachyte, the space between being occupied by Eocene sediments. D'Achiardi finds the materials of these two rocks to be chemically the same, and the mineral species contained in them, for the most part, identical, but while the trachyte has cooled rapidly upon the surface of the rocks, the porphyry was intruded through them, and cooled slowly. The same mineralogist notes the presence in the Apuan Alps of tormalinolite.

Tertiary.—Mr. W. Whitaker, in a Note on the Red crag of Norfolk, Eng., states that the unfossiliferous sand upon the surface of the crag is identical with the sand of the shelly crag below, which has not been eroded by surface waters before the deposition of the upper beds, but dissolved by the action of carbonated water after the overlying beds were deposited.

Glacial.—Professor J. E. Todd (Proc. Amer. Assoc., 1884) describes the geology and geography of the Missouri coteau, which he states to be neither a high plateau nor a typical one. It is built mostly of Cretaceous clays of the St. Pierre group, capped northward with thin even layers of Fox Hills sandstone, and southward with Loup River sandstone. Two moraines are quite easily traceable upon it, and these, from their elevation, position and general features are probably equivalent to the Altamont and Gary moraines named by Professor T. C. Chamberlin on the Coteau des Prairies. The outer moraine is the more pronounced, consisting of loops, convex usually toward the west and south, but in rare cases toward the north-west. Traces of four great lobes of the ice-sheet, pushing through from the James to the Missouri, can be found.

MINERALOGY AND PETROGRAPHY.[1]

METEORITES.—A number of very important contributions to the literature of these interesting bodies, which reach our globe directly from the regions of space, have recently been published. Papers relating to meteorites have heretofore been largely confined to detailed descriptions of particular falls. With the exception of Rose's essay on the classification of these bodies, little of a general nature regarding them has been produced until within the past year or two. Now, however, we have at least four

[1] Edited by Dr. GEO. H. WILLIAMS, of the Johns Hopkins Univ., Baltimore, Md.